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SUMMARY WITH CRITICAL APPRAISAL

Smartphone-, Tablet-, or App-Based Portable Ultrasound: A Review of Clinical Effectiveness

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About CADTH: CADTH is an independent, not-for-profit organization responsible for providing Canada's health care decision-makers with objective evidence to help make informed decisions about the optimal use of drugs, medical devices, diagnostics, and procedures in our health care system.

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Context and Policy Issues

Over time, advances in technology have allowed for previously bulky and fixed medical devices to become smaller and portable.[1] This change has resulted in portable ultrasound machines that can be brought to the patient and be used at the point-of-care.[1] As a result, point-of-care ultrasound technology is increasingly being used as a diagnostic tool.[1] More recently, ultrasound devices have been made even smaller and more portable by pairing a wireless ultrasound probe with a smartphone or tablet via an application. There remain questions about the clinical effectiveness, safety of these new devices compared to existing portable ultrasound and standard ultrasound. Concerns have also been noted with regards to maintaining privacy and security of medical data collected with a cell phone.[2]

This topic was identified as part of CADTH's Horizon Scanning Service for an early assessment bulletin. The objective of this Rapid Response report is to summarize the clinical effectiveness of smartphone-, tablet-, or app-based portable ultrasound devices.

Research Question

What is the clinical effectiveness of smartphone-, tablet-, or app-based portable ultrasound?

Key Findings

No evidence regarding the clinical effectiveness of smartphone-, tablet-, or app-based portable ultrasound was identified.

Methods

Literature Search Methods

A limited literature search was conducted by an information specialist on key resources including PubMed, the Cochrane Library, the University of York Centre for Reviews and Dissemination (CRD) databases, the websites of Canadian and major international health technology agencies, as well as a focused Internet search. The search strategy was comprised of both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. The main search concept was app and smartphone-based portable ultrasound devices. No filters were applied to limit the retrieval by study type. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 1, 2014 and August 29, 2019.

Selection Criteria and Methods

One reviewer screened citations and selected studies. In the first level of screening, titles and abstracts were reviewed and potentially relevant articles were retrieved and assessed for inclusion. The final selection of full-text articles was based on the inclusion criteria presented in Table 1.

Table 1: Selection Criteria

Population	Any patient requiring ultrasound
Intervention	Smartphone-, tablet-, or app-based ultrasound (e.g., Butterfly IQ, Clarius, Lumify [Philips], Sonon [Healcerion])
Comparator	Any other smartphone-, tablet-, or app-based portable ultrasound devices; Conventional ultrasound; Point-of-care or other portable ultrasound devices
Outcomes	Clinical effectiveness, safety
Study Designs	Health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized studies

Exclusion Criteria

Articles were excluded if they did not meet the selection criteria outlined in Table 1, they were duplicate publications, or were published prior to 2014.

Critical Appraisal of Individual Studies

No relevant studies were identified.

Summary of Evidence

Quantity of Research Available

A total of 385 citations were identified in the literature search. Following screening of titles and abstracts, 380 citations were excluded and five potentially relevant reports from the electronic search were retrieved for full-text review. No potentially relevant publications were retrieved from the grey literature search for full text review. Of these potentially relevant articles, five publications were excluded for various reasons, and no publications met the inclusion criteria and were included in this report. Appendix 1 presents the PRISMA[3] flowchart of the study selection.

Summary of Findings

No evidence was identified regarding the clinical effectiveness of smartphone-, tablet-, or app-based portable ultrasound; therefore, no summary can be provided.

Conclusions and Implications for Decision or Policy Making

It was not possible to determine the clinical effectiveness of smartphone-, tablet-, or app-based ultrasound devices. Future effectiveness and accuracy studies are needed to determine whether these devices are a suitable alternative to currently available portable and standard ultrasound devices.

References

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3. Liberati A, Altman DG, Tetzlaff J, Mulrow C, Gotzsche PC, Ioannidis JP, et al. The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration. *J Clin Epidemiol.* 2009;62(10):e1-e34.

Appendix 1: Selection of Included Studies